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Patent Claims

1. A drive train comprising an internal combustion engine and two electric drive units (31, 32), in which, between an output shaft of the internal combustion engine (engine shaft 15) and an output element (VE),

- a first power branch, which conducts the drive torque of the internal combustion engine, and a second power branch are provided at least in partial operating ranges,
- the first electric drive unit (31) exchanges power with the first power branch in partial operating ranges,
- the second electric drive unit (32) exchanges power with the second power branch in partial operating ranges, and
- a pick off gear unit (TE) is provided, by means of which the power of the first power branch and/or of the second power branch is transferred to the output element (VE),

characterized in that

- in a first operating position the power branches can be coupled directly to one another so that the power branches have a drive connection to a transmission element (HE) of the pick off gear unit (TE),

  and
- in a second operating position the power branches can be coupled to one another via the pick off gear unit (TE), the power branches having a drive connection to two transmission elements (HE, SE) of the pick off gear unit (TE).

2. The drive train as claimed in claim 1, characterized in that clutches (KE, KG) are provided by means of which the second electric drive unit (EM2) can

optionally

- in a first operating position (KE=X, KG=0) be placed in a drive connection with a transmission element (input shaft E) which conducts the drive torque of the internal combustion engine, and
- in a second operating position (KE=0, KG=X) be placed in a drive connection with the pick off gear unit (TE).

3. The drive train as claimed in claim 2, characterized in that the transmission element (input shaft E) conducting the drive torque of the internal combustion engine and, if appropriate, the drive torque of the second electric drive unit has a drive connection to a ring gear (HE) of the pick off gear unit (TE).

4. The drive train as claimed in one of claims 1 to 3, characterized in that in the second operating position (KE=0, KG=X) the second electric drive unit (32) is connected to a sun gear (SE) of the pick off gear unit (TE).

5. The drive train as claimed in claim 4, characterized in that the pick off gear unit (TE) has a double planet gear (PE) which has a drive connection to the ring gear (HE) and to a second ring gear (NHE).

6. The drive train as claimed in one of the preceding claims, characterized in that the sun gear (SE) can be connected to a brake (B1) so as to be fixed to the housing.

7. The drive train as claimed in one of the preceding claims, characterized in that the ring gear (NHE) can be connected to a brake (BN) so as to be fixed to the housing.

8. The drive train as claimed in one of the preceding claims, characterized in that the ring gear (NHE) can be connected to the sun gear (SE) by means of a clutch (K1).

9. The drive train as claimed in one of the preceding claims, characterized in that the web (PTE) of the pick off gear unit (TE) is connected to the output element (VE) so as to be fixed in terms of drive.

10. The drive train as claimed in one of the preceding claims, characterized in that the output element (VE) is an input element of a component transmission (TA, TU) which is connected downstream.

11. The drive train as claimed in claim 9, characterized in that, in addition to the web (PTE), power is output via the ring gear (HE).

12. The drive train as claimed in one of claims 1 to 11, characterized in that the second electric drive unit (32) can be decoupled from the force flow in partial operating ranges.

13. A method for operating a drive train as claimed in one of claims 1 to 12, in which, depending on the operating conditions of the drive train (10),

- the internal combustion engine is started with the second electric drive unit (32) switched off and clutches (KE, KG, KM) opened, by applying the output torque of the first electric drive unit (31) to the internal combustion engine,
- the internal combustion engine is started with clutches (KE, KM) closed, by applying the output torque of the first electric drive unit (31) and of the second electric drive unit (32) to the internal combustion engine.

14. The method as claimed in claim 13, characterized in that, depending on the operating conditions, the internal combustion engine is started with clutches (KM, KG) closed, by applying the drive torque of the first electric drive unit (31) and of the second electric drive unit (32) to the internal combustion engine with the intermediate connection of the pick off gear unit (TE).

15. The method for operating a drive train (10) as claimed in one of claims 1 to 12, in particular as claimed in claim 13 or 14, characterized in that, during a driving mode, drive is provided by means of the internal combustion engine, the first electric drive unit (31) and/or the second electric drive unit (32) in accordance with the operating conditions in partial operating ranges.

16. The method as claimed in claim 15, characterized in that in partial operating ranges, drive is provided exclusively by means of the internal combustion engine.

17. The method as claimed in claim 15 or 16, characterized in that in partial operating ranges, drive is provided by means of the internal combustion engine with the feeding-back of energy into a battery via the second electric drive unit (32).

18. The method as claimed in one of claims 15 to 17, characterized in that in partial operating ranges, drive is provided by means of the internal combustion engine and an electric drive unit (31; 32), this electric drive unit (31; 32) being fed at least partially by the other electric drive unit (32; 31) which is used in the generator operating mode.

19. A group of drive trains which each have a component transmission (TA, TU) connected downstream of

the output element (VE), comprising

- a first subgroup of drive trains (fig. 5; fig. 6; fig. 7),
  - which have an internal combustion engine and two electric drive units (31, 32) and
  - in which, between an output shaft of the internal combustion engine (engine shaft 15) and an output element (VE), a first power branch, which conducts the drive torque of the internal combustion engine, and a second power branch are provided
  - in which the first electric drive unit (31) exchanges power with the first power branch,
  - in which the second electric drive unit (32) exchanges power with the second power branch, and
  - in which a pick off gear unit (TE) is provided, by means of which the power of the first power branch and/or of the second power branch is transferred to the output element (VE), in particular according to one of claims 1 to 10,
- a second subgroup of drive trains (fig. 1; fig. 3) for which a hydrodynamic torque converter (12) is connected between the internal combustion engine and the output element (VE) in the installation area of the first and/or second electric drive unit (31; 32).

20. The group of drive trains as claimed in claim 19, characterized in that a third subgroup of drive trains, in which a starting clutch is intermediately connected between the internal combustion engine and the output element (VE) in the installation area of the first and/or second electric drive unit (31; 32).

21. The group of drive trains as claimed in claim 19 or 20, characterized in that the pick off gear unit

(TE) is an input-end planet set of the component transmission (11).